REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-4, 6-10, 12-16, and 18 are currently pending. Claims 1, 6, 7, 12, 13, and 18 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, the specification was objected to as containing an embedded hyperlink; Claims 7-10 and 12 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter; and Claims 1-4, 6-10, 12-16, and 18 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Liu et al. reference ("A Hierarchical Hybrid System Model and Its Simulation").

Applicants respectfully submit that the objection to the specification is rendered moot by the present amendment to page 2 of the specification. The specification has been amended to no longer include an embedded hyperlink.

Applicants respectfully submit that the rejections of Claims 7-10 and 12 are rendered moot by the present amendment to independent Claims 7 and 12. Claim 7 has been amended to clarify that the simulation apparatus includes a processor and simulates a behavior of a mechanism of a mechanical device. Accordingly, Applicants respectfully submit that Claim 7 is not directed to software per se and is patentable under 35 U.S.C. § 101.

Amended Claim 1 is directed to a simulation method for simulating a behavior of a mechanism of a mechanical device using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software, the hybrid model including a state transition model and a continuous system model, the method comprising: (1) inputting hybrid model description data representing the hybrid model; (2) analyzing the hybrid model description data to extract first description data of the state transition model and

second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations; (3) generating a plurality of internal data expressions of all the continuous system equations, based on the extracted second description data; (4) generating a table representing a relationship between the internal data expressions of the continuous system equations including the simultaneous equations and switching conditions thereof, based on the extracted first description data; (5) starting a simulation of the mechanism after completion of generating the table and generating the internal data expressions; (6) selecting an active continuous system equation by looking up the table according to an occurrence of an event; and (7) outputting data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using the internal data expressions that correspond to the selected active continuous system equation, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software. The changes to Claim 1 are supported by the originally filed specification and do not add new matter.[1]

The Liu et al. reference is directed to a system for modeling hierarchical hybrid systems by combining continuous time models with finite state automaton. In particular, the Liu et al. reference discloses a system that starts from initial state, executes continuous dynamic equations for a particular time, makes a discrete state transition, and then runs another continuous dynamic equation for another period of time. In particular, as shown in Figure 1, the Liu et al. reference discloses a finite state diagram including discrete states q1 and q2, wherein for each state there is a continuous subsystem in the form of a set of ordinary differential equations that governs the dynamics of the subsystem. Further, the Liu et al. reference discloses breakpoints that are time points where the vector field f, which defines the

[1] See, e.g., page 16 of the specification.

dynamics of the subsystem, is not continuous such that the solutions at these points are not well defined. The Liu et al. reference discloses that predictable breakpoints are stored chronologically in a breakpoint table and can be handled at the time in which they are scheduled to occur. Further, the Liu et al. reference discloses unpredictable breakpoints that are unknown until the time they occur, and that the unpredictable breakpoints are handled by querying the various system components after each integration step. Finally, Applicants note that the Liu et al. reference discloses that the system may take a discrete state transition whenever a "guard expression" evaluates to true, which is checked after each integration step.

However, Applicants respectfully submit that the Liu et al. reference fails to disclose the steps of generating a plurality of internal data expressions of all the continuous system equations, based on extracted second description data of the continuous system model, and generating a table representing a relationship between the internal data expressions of the continuous system equations including the simultaneous equations and switching conditions thereof, based on the extracted first description data of the state transition model, as recited in amended Claim 1. The Liu et al. reference is silent regarding generating the plurality of internal data expressions and generating the table representing a relationship between the internal data expressions of the continuous system equations and switching conditions thereof, as recited in Claim 1. While the Liu et al. reference discloses a breakpoint table for handling predictable breakpoints, this table is based on a schedule of known breakpoints, not on the state transition model. In contrast, Claim 1 requires selecting an active continuous system equation by using the generated table according to an occurrence of an event.

In a non-limiting example, Applicants note that the invention recited in Claim 1 has the advantage that when a simulation is performed, the equations are switched by simple operation of changing the setting of a flag which is part of the internal data expressions of the

equations and which indicates whether any equations are active. Applicants note that Claim 2 further clarifies this step and positively recites the flag.

In summary, Applicants respectfully submit that the Liu et al. reference fails to disclose a table representing a relationship between the internal data expressions of the continuous system equations and switching conditions thereof, as recited in Claim 1. The predictable breakpoint table disclosed in the Liu et al. reference is used to control the step size in integration, but is not based on extracted first description data of the state transition model, as required by Claim 1.

For the reasons stated above, Applicants respectfully submit that the rejection of Claim 1 is rendered moot by the present amendment to that claim and that Claim 1 patentably defines over the Liu et al. reference.

Independent Claims 6, 7, 12, 13, and 18 recite limitations analogous to the limitations recited in Claim 1. Moreover, Claims 6, 7, 12, 13, and 18 have been amended in a manner analogous to the amendment to Claim 1. Accordingly, for the reasons stated above, Applicants respectfully submit that the rejections of the above-noted independent claims are rendered moot by the present amendment to those claims.

Thus, it is respectfully submitted that independent Claims 1, 6, 7, 12, 13, and 18 (and all associated dependent claims) patentably define over the Liu et al. reference.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Kurt M. Berger

Eckhard H. Kuesters
Attorney of Record
Registration No. 28,870

Kurt M. Berger, Ph.D.
Registration No. 51,461

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413-2220
(OSMMN 06/04)

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